ERIC Document Resume	See Instruction Sheet	DATE OF RESUME 9	DATE RECEIVED

A. PUBLICATION DATA

1. ERIC NUMBER	2. ORIGINATOR CONTROL NO(S).	3. IDENTIFICATION NO.
ED001238	N.A.	N.A.

DO NOT WRITE IN SPACE BELOW

4. AUTHOR(S):
Shulman, Lee S.

5. TITLE OF DOCUMENT ABSTRACTED:
Seeking Styles and Individual Differences in Patterns of Inquiry

6. PUBLICATION TITLE:
N.A.

7. EDITOR(S):
N.A.

8. PLACE OF ORIGIN
ORG. Michigan State Univ.
ST. East Lansing, Mich.
CITY, STATE

9. PUBLISHER OR SOURCE
American Educational Research Associates
Chicago, Illinois

TELE. EXT.
INST'LOC CODE

10. VOL.	11. PAGES	12. MO./YR.	13. TOTAL PP.
N.A.	N.A.	Feb. 65	10

MICROFILM COPY AVAILABLE
YES ☒ NO ☐

COPYRIGHT GRANTED
YES ☐ NO ☒

COPYRIGHT RELEASE FILED
YES ☐ NO ☐

TYPE OF REPORT
PROPOSAL ☐
IN-PROGRESS ☐
FINAL ☒
FOLLOW-UP ☐

OTHER ERIC REFERENCES:

ERIC SATELLITE CODE

B. INDEXING DATA

14. SUBJECT AREA

15. TYPE OF ENDEAVOR
report

16. INDEXING TERMS (6-12)
personality traits
behavior patterns
role playing
inquiry studies
teacher education

17. ABSTRACT (MAX. 250 WORDS)

A natural inquiry situation was constructed which included: a range of potentially problematic situations which could be reacted to by the subjects, a role playing set to engage their emotional investment, and interval and external information sources which the teachers could manipulate in their inquiries.

The objectives of this study were to develop a method of observing and measuring inquiries and to relate them to other individual differences in personality and intellectual characteristics.

A situation was created called "Teachers In-Basket", a stimulated teachers desk with a pile of potential problems. Five scores were elicited in this situation; materials attended, problems sensed, information sources, competence, and time. Twenty-two subjects were chosen to participate. The results show that precise and meaningful descriptions of inquiry behavior can be made without the necessity of presenting subjects with specific "problems" to solve.

In addition, many differences in habitual patterns of seeking and inquiry strategies can be understood in terms of personality motivational and intellectual measures which can be gathered outside the inquiry situation itself.

ERIC No.

18. SOURCE OF ABSTRACT

C. FUNDING DATA

19. SUPPORTING ORGANIZATION	20. DIVISION OR DEPT.	21. CONTRACT NO. / PROJECT NO.
	22. TOTAL COST OF PROJECT	
	23. DURATION OF PROJECT	U.S. Department of Health, Education, and Welfare Office of Education

ERIC Form 1

REPRINTED BY PERMISSION
U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
OFFICE OF EDUCATION

THIS DOCUMENT HAS BEEN PRINTED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

ED001238 000505

Please Return To:

CLEARINGHOUSE
CENTER FOR RESEARCH AND DEVELOPMENT
ON EDUCATIONAL DIFFERENCES
HARVARD GRADUATE SCHOOL OF EDUCATION
CAMBRIDGE, MASSACHUSETTS 02138

SEEKING STYLES AND INDIVIDUAL DIFFERENCES IN PATTERNS OF INQUIRY*

Lee S. Shulman
Michigan State University

The purpose of this research was to characterize the processes of inquiry as they are observed in a "natural" inquiry situation. The current interest in "inquiry" as an operation central to the process of education has reawakened research activities concerned with cognitive processes as distinct from their products. In traditional studies of problem-solving processes, the subjects are individually presented with a problem, or series of problems, and their processes and resolutions are then noted subsequent to the presentation. Inquiry under natural conditions, however, differs in a number of major dimensions from these experimental situations. The "real world" does not consist of carefully constructed situations that are presented to individuals as problems-for-solution. Instead, individuals move through an array of stimulus situations, which are potentially problematic in varying degrees, selectively reacting to some and not to others. Those situations that are problematic do not present themselves one at a time in a predetermined numerical order, but rather derive both their definition and the order in which they are handled from the cognitive activity of the inquirer.

In the present research, a "natural" inquiry situation was constructed, which included (1) a range of potentially problematic situations which could be reacted to by the subjects, (2) a role-playing set to engage their emotional investment, and (3) a universe of internal and external information sources which they could manipuate in their inquiries. It was, thus, possible to observe the total inquiry process, rather than the truncated inquiry generally denoted by the term "problem-solving."

---

*Paper read at meetings of American Educational Research Association; Chicago, February 12, 1965.

The objectives of this research were (1) to develop an effective method of observing and measuring inquiry behavior, (2) to develop a set of terms for qualitatively and quantitatively describing the processes so observed and so measured, and (3) to relate these processes to other individual differences in the realm of intellectual and personality characteristics.

The assertion that individuals differ in the inquiry processes they employ will elicit neither argument nor excitement. The problem to which this study was addressed was that of systematically analyzing and classifying these processes. The term "seeking style" will be used to denote a consistent mode of initiating, conducting and terminating an inquiry that is characteristic of individuals or groups of individuals. These styles, it is theorized, are related to more general systems of values, attitudes and cognitive skills that predispose the individual toward his particular brand of seeking behavior. Seeking styles are seen as varying along a continuum from the dialectical to the didactic. Operationally, dialectical seekers are more sensitive to potential problems, employ a wider range of information sources and exhibit a more flexible and reflective seeking pattern than do didactic seekers.

Design

The research design for this study involved the following steps: (1) the development and testing of an "in-basket" technique designed to measure the inquiry processes, (2) the screening of a large group of subjects with a battery of instruments measuring characteristics underlying individual differences in seeking style, in order to select a sample for the inquiry study, and (3) the testing of hypotheses based upon the theory of seeking styles, and the characterization of the observed processes in terms of that theory.

The Inquiry Situation

The specific technique developed for this research to study the inquiry process was the "Teacher's In-Basket," a simulated teacher's desk, with its pile of potential problems. The subject is placed at a desk and informed that she is to play the role of a new teacher who has recently been hired to take charge of a 6th grade class. It is the middle of the semester and, since the class has been handled by substitutes for the past two months, many things have piled up on her desk. She may begin where she likes and do as she pleases. It is her first day in school, and because of a school holiday, no pupils are present. No time limit is suggested.

The contents of her in-basket include phone messages, memoranda from various members of the faculty and administration, school newsletters, and research information on this 6th grade class in the form of individual scores on a personality test and a class sociogram. These materials vary in their likelihoods of being viewed as problems by the subject, and in the manners in which they are perceived as problems, if at all.

The written materials include 6th grade report cards, current achievement and aptitude test scores and attendance records, which are immediately available to the subject in a file on her desk. The subject has also been informed that she can obtain full cumulative records for the first five grades, and medical records for each of her 24 pupils. These are to be procured by phoning the school secretary. This array of information has embedded within it many potentially problematic elements, varying from the obvious to the very obscure.

The "human" sources of information that are at the subject's disposal are contacted by phone. The school secretary and principal play predetermined consistent roles in response to requests of information and advice coming from the

subject. The secretary also may be asked to place "outside" calls to parents, family doctors, other teachers, etc.

An additional source of information for the subject is her "reference memory," a talking alter-ego with a storehouse of facts, who "knows" everything the subject would know, had she read the teacher's handbook, been interviewed by members of the school administration, attended teachers' meetings and orientations, gossipped with other teachers, and the like. She can consult this reference memory as often as she likes, much as she would, in fact, tap her own memory. She speaks to this reference by phone.

All observations were made through a one-way viewing mirror, with the rooms connected through a two-way telephone exchange. All sessions were tape recorded. An interview followed the inquiry session of each subject, in order to clarify the reasons the subject made certain decisions at certain times, or used given pieces of evidence to infer specific conclusions, or to fill in gaps in our understanding of her processes.

Finally, the subject was urged and reminded to <u>think aloud</u> during the entire inquiry session, which lasts approximately two and one-half hours. The pilot study had already demonstrated that, by employing conditioning signals (via buzzer) as reminders, almost all subjects could verbalize sufficiently well to illuminate greatly the inquiry processes they were employing.

<u>The Procedures of Analysis</u>

Five basic scores were elicited in this situation: (1) materials attended, (2) problems sensed, (3) information sources, (4) competence, and (5) time.

(1) <u>Materials Attended</u> is the number of pieces of material to which the subject attended during the inquiry period, representing the number of "bits" processed by the s bject. This measure is termed "Bits," when part of a ratio, and had an inter-rater reliability of +.78.

(2) Problem Sensitivity is the number of embedded potentially problematic elements to which the subject reacted in the inquiry situation. It is abbreviated as P.S., when part of a ratio, and its inter-rater reliability was +.97.

(3) Information Sources is the number of categories of information brought to bear by the subject on twelve selected problems in the in-basket situation. It reflects the breadth with which the subject uses many sources of information in her search activities, and the variability of her search patterns. It is abbreviated "Info" in ratios.

(4) Competence is a measure of the adequacy of the subject's problem resolutions in the inquiry situation, independent of the processes preceding them. It is relevant as the measure of "product" for this research, as against "process," into which category the other measures fall. This measure is used to examine the extent to which process and product measures are related to each other in inquiry as it is here being studied. The inter-rater reliability of this score was +.95.

(5) Time is the number of minutes the subject chose to spend in her work on the in-basket. Since no time limit had been set for them, each subject could determine when she had "finished."

In addition, two inquiry ratios were calculated. These ratios reflected relationships among three of the basic measures, Time, Materials Attended (Bits), and Information Sources (Info). In all these ratios, as in the above measures, the basic scores were first standardized before the ratio was computed.

The first ratio, Bits/Time, is a measure of input speed, i.e., how quickly materials are processed by the subject.

The second ratio, Info/Bits, reflects the breadth of the subject's information-seeking relative to the total number of materials processed during the inquiry session. The higher this ratio, the more variably and flexibly did the subject employ the potential array of information sources within the inquiry situation.

In order more easily to work with measures of inquiry process, a General Inquiry score was desirable. This score was derived by combining the five basic inquiry measures expected to differentiate between styles; Time, Problem Sensitivity, Competence, and the two ratios. Each subject was ranked on each of the variables and his ranks summed across them, to arrive at a single overall total. All variables were ranked from the highest to the lowest scores, with the exception of Bits/Time, on which dialectical seekers were expected to be low. The resulting score was termed General Inquiry.

Selection of Subjects and Hypotheses

A group of 101 female senior teacher-trainees from four mid-West universities were screened with a battery of tests which measured those variables thought to underlie individual seeking style differences. This battery included (1) Thurstone's Flexibility of Closure Test, from which three scores were derived; a Closure Flexibility score, and two scores, Risk Z and Risk S, reflecting the subjects' willingness to take risks in the test situation, (2) Getzels and Jackson's Uses Test, (3) Getzels and Jackson's Word Association Test, and (4) the Inventory of Beliefs, taken from the work of Stern, Stein and Bloom. In addition, the Verbal and Mathematical Aptitude scores for each subject on the School and College Ability Test or its converted equivalent were recorded. These latter were seen as measures of general aptitude. The sample selected consisted of twenty-two subjects who represented extreme differences in the characteristics underlying seeking differences. Five were characterized as dialectical, with

with high general aptitude, five as didactic, with high aptitude, four as dialectical, with low aptitude, and four as didactic with low aptitude. In addition, four subjects whose screening score profiles were characterized by widely varying patterns were selected. Of the twenty-two subjects in the sample, only one was unable to participate. It was hypothesized that the group predicted to be dialectical would have higher scores on the Time, Problem Sensitivity, Information Sources and Info/Bits variables, whereas the didactic prediction group would have higher Bits/Time ratios. Competence, a product measure, was not expected to differentiate between the two groups. The General Inquiry measure was, of course, expected to differentiate.

Findings

In order to facilitate analysis of individual patterns, all basic scores were standardized with a mean of 50 and a standard deviation of 10. Hence, ratios were relationships between standard scores. The hypotheses advanced dealt with predicted relationships between the screening variables and the inquiry process variables. Table I reports the correlation coefficients between the eight inquiry process scores and the screening measures. For purposes of this analysis, the four "pattern" subjects were assigned to the predictor group to which each was most similar; two thus becoming dialectical, and two didactic.

Examination of Table I indicated that a number of the screening measures had effectively predicted inquiry process scores. Closure Flexibility, Risk S, and the Inventory of Beliefs among the predictor measures, and Mathematical SCAT of the aptitude measures, predicted the General Inquiry score equally well. The superiority of the "seeking style" predictors over the aptitude measures in predicting inquiry process was not confirmed. An explanation was offerred in terms of the high numerical content of the in-basket task and the likely inquiry characteristic of women who score well on a test of mathematical aptitude.

TABLE I

SCREENING AND INQUIRY PROCESS CORRELATIONS

	Closure Flexibility	Risk Z	Risk S	Verbal SCAT	Math. SCAT	Word Assn.	Uses	Beliefs
Time	.64	.12	.62	.12	.51	.53	.55	.25
Problem Sensitivity	.55	.04	.55	.04	.63	.50	.42	.06
Materials Attended	.08	-.20	-.06	-.28	.05	.36	.18	-.46
Information Sources	.39	.12	.35	.16	.58	.40	.31	.24
Competence	.23	.11	.22	.10	.14	.47	.36	.28
Bits/Time	-.51	-.22	-.60	-.31	-.43	-.17	-.35	-.55
Info/Bits	.32	.26	.38	.39	.42	.14	.18	.55
Gen. Inquiry	.46	.15	.52	.26	.52	.34	.34	.48

Note: For N=21, the probability of a correlation of .37 occurring by chance is .05; for a correlation of .50, .01.

A more direct test of the hypotheses lies in the comparison of mean scores on the inquiry process variables. Table II reports the mean scores for each group on the eight-inquiry variables. In the table, the difference between the means is reported, and the probability of that difference occurring by chance is noted, as determined by the Rank-Sum Test. These data confirmed the hypothesis that the two screening groups were, in fact, significantly different on Time, Problem Sensitivity, Info/Bits, Bits/Time and General Inquiry in the predicted directions. Only the hypothesis for the Information variable was not confirmed. As expected, the two groups did not differ significantly on the Competence measure, though the direction of the difference favored the Dialectical group.

TABLE II

MEAN SCORES AND DIFFERENCES BETWEEN DIALECTICAL AND DIDACTIC SCREENING GROUPS OVER 8 INQUIRY PROCESS VARIABLES

	Dialectical Mean	Didactic Mean	Difference	P N=21
Time	55.4	44.7	10.7	.009
Problem Sensitivity	52.7	46.6	6.1	.046
Materials Attended	48.0	52.1	- 4.1	.396
Information Sources	52.0	47.8	4.2	.145
Competence	53.0	47.1	5.9	.102
Info/Bits	1.14	.92	.22	.039
Bits/Time	.87	1.19	- .32	.004
General Inquiry	79.4	53.2	26.2	.016

As seen in Table III, intercorrelations among the inquiry process variables themselves were high, suggesting the existence of consistent seeking style tendencies. This was further supported when a number of individual cases were examined, and consistent, intuitively meaningful relationships were observed. The generally lower correlations found between Competence and the other inquiry measures further confirms the expectation that process and product measures in inquiry research may be relatively independent.

TABLE III

INTERCORRELATIONS AMONG INQUIRY PROCESS VARIABLES*

	P.S.	Bits	Info	Competence	Info/Bits	Bits/Time	Gen. Inquiry
Time	.79	.23	.60	.39	.33	-.67	.67
P.S.		.33	.76	.41	.32	-.44	.70
Bits			.04	.14	-.68	.55	.30
Information				.44	.65	-.48	.79
Competence					.22	-.14	.57
Info/Bits						-.80	.80
Bits/Time							-.78

*For N=21, the probability of a correlation of .37 occurring by chance is .05; for a correlation of .50, .01.

Conclusion

This research has demonstrated that precise and meaningful descriptions of inquiry behavior can be made without the necessity of presenting subjects with specific "problems" to solve. The early stages of the inquiry process, such as problem sensing, can be observed and quantified readily, and the quantities so attained related meaningfully to other, more easily observed aspects of cognitive behavior. In addition, many differences observed among individuals in their habitual patterns of seeking and inquiry strategies can be understood in terms of personality, motivational and intellectual measures which can be gathered outside the inquiry situation itself.